

## Chanwoo Park, Ph.D.

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### RESEARCH INTERESTS

Two-Phase Heat Transfer (Boiling and Evaporation), Heat and Mass Transfer in Porous Media, Renewable Energy Systems

### (1) PROFESSIONAL PREPARATION

Hanyang University, Seoul, South Korea	Mechanical Engineering	B.S.	1989
Korea Advanced Institute of Science and Technology (KAIST), Taejon, South Korea	Mechanical Engineering	M.S.	1992
The University of Michigan, Ann Arbor, Michigan	Mechanical Engineering	Ph.D.	2000

### (2) APPOINTMENTS

01/08 – Present	Assistant Professor, The Mechanical Engineering Dept., University of Nevada, Reno, NV.
11/06 – 12/07	Group Leader, Advanced Cooling Technologies, Inc., Lancaster, Pennsylvania.
01/04 – 11/06	Senior Engineer, Advanced Cooling Technologies, Inc., Lancaster, Pennsylvania.
02/01 – 10/03	Research Specialist, Hybrid Electric Vehicle Development Team, Ford Research and Advanced Engineering Laboratory, Ford Motor Company, Dearborn, Michigan.
09/00 – 02/01	Research Fellow, Laboratory for Research in Transport, Reaction and Phase Change in Porous Media, University of Michigan, Ann Arbor, Michigan.
09/97 – 08/00	Graduate Research Assistant, Laboratory for Research in Transport, Reaction and Phase Change in Porous Media, University of Michigan, Ann Arbor, Michigan.
06/93 – 07/93	Visiting Research Scientist, The Luikov Heat and Mass Transfer Institute, Minsk, The Republic of Belarus.
03/92 – 08/96	Research Scientist, Air Conditioning and Environmental Control Laboratory, Korea Institute of Science and Technology, Seoul, South Korea.
03/90 – 02/92	Graduate Research Assistant, Heat Transfer Laboratory, Korea Advanced Institute of Science and Technology (KAIST), Taejon, South Korea.

### (3) GRADUATE ADVISORS:

Ph.D. Advisor	Massoud Kaviany, University of Michigan, Ann Arbor, Michigan.
M.S. Advisor	Tae-Ho Song, KAIST, Taejon, South Korea.

### (4) PUBLICATIONS:

14 Journal Papers, 28 Conference Papers and 2 Patents and 4 Patent Publications **[See the sections (11)–(14)]**

### (5) AWARDS AND HONORS:

#### External Fund Awards (Total: \$571,609)

SERDP (PI: Amy Childress, \$1,355,000) Park's portion: ~ \$180K/ 4 years (recommended for funding).  
Nevada NSF EPSCoR, Undergraduate Research Opportunity Program, Award Period: November 1, 2011–May 31, 2012, \$4,300 (including student support \$3,900).  
DOE, Geothermal Technologies Program, (PI: Rich Wirtz, \$1.2M), Award Period: September, 2010–September, 2012, Park's portion: \$236,439.  
DOD Air Force/ACT, Award Period: June, 2008–April, 2010, \$137,000.  
Nevada NSF EPSCoR, Undergraduate Research Opportunity Program, Award Period: November 1, 2009–May 31, 2010, \$4,300 (including student support \$3,900).  
Nevada NASA EPSCoR, Proposal Development Grant, Award Period: July–December, 2008, \$4,795.  
Nevada NASA EPSCoR, Travel Grant, Award Period: January 2009–August, 2009, \$4,775.

#### Internal Fund Awards (Total: \$57,054)

Laboratory Facility Upgrade for Hydrogen Use and Electrical Outlet, May, 2009, \$24,405.  
Green Technology Entrepreneurship Academy, Tahoe Center for Environmental Sciences, Incline Village, NV, July 7-11, 2008, room/board tuition fees (\$150) support by NIREC.  
UNR Student Technology Fee Distribution, "Computational Fluid Dynamics (CFD) Facility Development for Virtual Fluids Laboratory", May-June, 2008, \$17,500.  
Junior Faculty Research Grant (JFRG), Grant Period: July, 2008-December 2009, \$ 14,999.

*Fund Awards as PI at the Previous Employment at Advanced Cooling Technologies, Inc. (Total:\$3,462,016)*

NASA JPL (SBIR Phase 2), Vapor Compressor-Driven Hybrid Two-Phase Loop, December 2007-November 2009, \$650,000.  
NASA JPL, Vapor Compressor-Driven Hybrid Two-Phase Loop Hardware Fabrication, August 2007-September 2007, \$9,865.  
NASA JPL (SBIR Phase 1), Vapor Compressor-Driven Hybrid Two-Phase Loop, January 2007-July 2007, \$69,822.  
SAIC/U.S. Army RDECOM-TARDEC, Advanced Inverter Cooling Demonstration Project, Award Period: April 2007-December 2007, \$246,321.  
U.S. Air Force Research Laboratory (SBIR Phase 2) Fast Response Fabric Test Setup and Dynamic Model for Burnsim, Award Period: January 2008-December 2009, \$749,680.  
U.S. Air Force Research Laboratory (SBIR Phase 1), Fast Response Fabric Test Setup and Dynamic Model for Burnsim, Award Period: April 2007-December 2007, \$99,828.  
U.S. Army RDECOM-TARDEC (SBIR Phase 2), Shock and Vibration Tolerant Capillary Two-Phase Loops, Award Period: September 2007-August 2009, \$725,000.  
U.S. Army RDECOM-TARDEC (SBIR Phase 1), Shock and Vibration Tolerant Capillary Two-Phase Loops, Award Period: November 2006-May 2007, \$68,783.  
U.S. AFRL/PRPS (SBIR Phase 2), Passive High Performance Heat Storage and Dissipation Technology for Transient High Power Thermal Management, Award Period: September 2005-August 2007, \$742,875.  
U.S. Missile Defense Agency (STTR Phase 1), Passive High Performance Heat Storage and Dissipation Technology for Transient High Power Thermal Management, Award Period: September 2004-March 2005, \$99,842.

*Honors*

Scholarship, The Korean American Scholarship Foundation, 2000.  
Outstanding Researcher Award, Korea Institute of Science and Technology, 1993.  
Korea Government Fellowship, Korea Advanced Institute of Science and Technology, 1990-1992.

**(6) RESEARCH CONTRACT AWARDS:**

Sponsors: U.S. Department of Energy, Nevada NSF EPSCoR, Nevada NASA EPSCoR, U.S. Army RDECOM-TARDEC, U.S. Navy NSWC, U.S. Air Force AFRL, U.S. Missile Defense Agency, NASA/JPL, Science Applications International Corp (SAIC) and Advanced Cooling Technologies, Inc.

**(7) PROFESSIONAL SOCIETIES:**

ASME, AIAA (Senior Member grade) and SAE Members.

**(8) PROFESSIONAL ACTIVITIES:**

Member of ASME Heat Transfer Division Technical Committee (K-13, Heat Transfer in Multiphase Systems, 2008 ~ present)  
Member of AIAA Thermophysics Technical Committee (to be nominated in 2012 year)  
Session Co-Chairs of 2012 ASME Summer Heat Transfer Conference (Track 6: Multi-phase Systems, Topic 4: Boiling Heat Transfer, Topic 6: Heat Pipes)  
Session Chair of 2010 International Heat Transfer Conference (Session #15-1: Single-Phase Jets)  
Session Chair of 2009 ASME Summer Heat Transfer Conference (Track 7: Heat Transfer in Multiphase Systems, Session 4: Heat Pipe)  
Session Co-Chair of 2009 ASME International Mechanical Engineering Congress & Exposition (Track 7: Heat Transfer in Multiphase Systems, Session 4: Multiphase Heat Transfer in Energy Systems)  
Reviewer of NSF Proposal Review Panel (ENG/CBET/Thermal Transport Processes, May, 2011)  
Reviewer of NV NASA Space Grant Scholarship and Fellowship Applications (Fall 2010; Spring, 2011)  
Member of the Site-Visit- Committee of Automotive Partnership Canada (APC) of Natural Sciences and Engineering Research Council of Canada (NSERC) (2009)

Proposal reviewer for US Army Medical Research and Material Command (USAMRMC) and American Institute of Biological Sciences (AIBS) (2009)

**(9) JOURNAL REVIEW:**

Journal of Heat Transfer  
Progress in Energy and Combustion Science  
International Journal of Hydrogen Energy  
International Journal of Multiphase Flow  
Applied Mathematical Modeling  
International Journal of Energy Research  
International Journal of Thermal Sciences

**(10) INVITED TALKS:**

1. US-Korea Conference (UKC) 2011, Panelist of US-Korea Leaders Forum on Green Energy, Park City, Utah, August 11, 2011.
2. Korea Advanced Institute of Science and Technology, "Two-phase cooling for power electronics and battery thermal management at pack and cell levels," Deajeon, Korea, June 10, 2011.
3. Korea Institute of Energy Research, "Two-phase cooling for power electronics and battery thermal management at pack and cell levels," Deajeon, Korea, June 9, 2011.
4. Chon Buk University, "Two-phase cooling for power electronics and battery thermal management at pack and cell levels," Jeonju, Korea, June 8, 2011.
5. Hyundai/Kia Motors R&D Division, "Two-phase cooling for power electronics and battery thermal management at pack and cell levels," Hwaseong-Si, Gyeonggi Province, Korea, June 7, 2011.
6. Kook Min University, "Two-phase cooling for power electronics and battery thermal management at pack and cell levels," Seoul, Korea, June 1, 2011.
7. Ford Motor Company, Advanced Engineering Center, "Two-phase cooling for power electronics and battery thermal management at pack and cell levels," Dearborn, MI, April 13, 2011.
8. Battery Congress 2011, "Advanced Li-ion Battery Thermal Management at Pack and Cell Levels," University of Michigan, Ann Arbor, MI, April 11-12, 2011.
9. National Renewable Energy Laboratory, "Hybrid Two-Phase Loop Technology for Electronics Thermal Management", Golden, CO, August 13, 2008.
10. 2007 Interagency Advanced Power Group, Mechanical Working Group Meeting, "Two-Phase Heat Transfer Research at ACT", Fort Belvoir, Alexandria, VA, May 9-10, 2007.
11. 2007 Spacecraft Thermal Control Workshop, "Spacecraft Thermal Management using Advanced Hybrid Two-Phase Loop Technology", El Segundo, February 27-March 1, 2007.
12. 2006 Interagency Advanced Power Group, Mechanical Working Group Meeting, "Advanced Thermal Management Technologies", Cleveland, OH, May 22-24, 2006.
13. 2006 Advanced Technology Workshop, International Microelectronics And Packaging Society (IMAPS), "Advanced Hybrid Cooling Loop Technology for Electronic Thermal Management", Palo Alto, California, September 10-13, 2006.
14. 2005 Spacecraft Thermal Control Workshop, "Hybrid Loop Cooling of High Heat Flux Components", El Segundo, California, March 9-11, 2005.
15. 2004 Advanced Technology Workshop, International Microelectronics And Packaging Society (IMAPS), "High Performance Heat Spreader for High Power Electronics," Palo Alto, California, October 25-27, 2004.
16. 2004 Spring Packaging Symposium, International Microelectronics And Packaging Society (IMAPS)-Garden State Chapter, "High Performance Heat Spreader Using Single-Phase Oscillating Flow" Murray Hill, New Jersey, May 12, 2004.

**(11) JOURNAL PUBLICATIONS:**

1. Sangsoo Lee, Batikan Koroglu, and *Chanwoo Park*, 2011 "Experimental Investigation of Capillary-Assisted Solution Wetting and Heat Transfer Using a Micro-Scale, Porous-Layer Coating on Horizontal-Tube, Falling-Film Heat Exchanger," International Journal of Refrigeration, doi:10.1016/j.ijrefrig.2011.11.015.
2. Evan Le, *Chanwoo Park*, and Sage Hiibel, 2011, "Investigation of the Effect of Growth from Low to High Biomass Concentration inside a Photobioreactor on Hydrodynamic Properties of *Scenedesmus Obliquus*," ASME Journal of Energy Resources Technology, In Press.

3. Sangsoo Lee and **Chanwoo Park**, 2011, "Experiment-Based Thermal Model for Permeable Clothing Systems under Hot Air Jet Impingement Conditions," *International Journal of Thermal Sciences*, Vol.51, pp.102-111.
4. Michael Crepinsek and **Chanwoo Park**, 2011, "Effect of Operational Conditions on Cooling Performance of Pump-Assisted and Capillary-Driven Two-Phase Loop," *AIAA Journal of Thermophysics and Heat Transfer*, Vol.25, No.4, pp.572-580.
5. Rajib Mahamud and **Chanwoo Park**, 2011, "Reciprocating Cooling Flow for Li-ion Battery Thermal Management to Improve Temperature Uniformity," *Journal of Power Sources*, Vol. 196, pp.5685-5696.
6. **Chanwoo Park**, Aparna Vallury, Jon Zuo, 2009, "Performance Evaluation of Pump-Assisted Capillary Two-Phase Loop," *ASME Journal of Thermal Science and Engineering Applications*, Vol. 1, pp.022004-1-8.
7. Park, I.-S., Kim, J.-K., Kim, K.J., Zhang, J., **Park, C.**, Gawlik, K., 2009, "Investigation of Coupled AB5 Type High-Power Metal Hydride Reactors", *International Journal of Hydrogen Energy*, Vol.34, pp.5770-5777.
8. Eric Sunada, **Chanwoo Park**, Jennifer Miller, Gani Ganapathi, Gajanana Birur, 2008, "Start-Up Characteristics and Gravity Effects on a Medium/High-Lift Heat Pump using Advanced Hybrid Loop Technology", *SAE International Journal of Aerospace*, Vol.1, No.1, pp.1-14.
9. **Chanwoo Park**, Jon Zuo, Paul Rogers, Jeffrey Perez, 2005, "Two-Phase Flow Cooling for Vehicle Thermal Management", *SAE Transactions, Journal of Passenger Cars: Mechanical Systems*, Vol.114, No.6, pp.2082-2087.
10. **Chanwoo Park**, Arun K. Jaura, 2003, "Dynamic Thermal Model of Li-Ion Battery for Predictive Behavior in Hybrid and Fuel Cell Vehicles", *SAE Transactions, Journal of Engines*, Vol.112, No.3, pp.1835-1842.
11. **C.-W. Park**, M. Kaviani, 2002, "Evaporation-Combustion Affected by In-cylinder, Reciprocating Porous-Regenerator," *ASME Journal of Heat Transfer*, Vol.124, pp.184-194.
12. **C.-W. Park**, M. Kaviani, 2000, "Combustion-Thermoelectric Tube," *ASME Journal of Heat Transfer*, Vol.122, pp.721-729.
13. B.H. Kang, **C.-W. Park**, C.S. Lee, 1996, "Dynamic behavior of heat and hydrogen transfer in a metal hydride cooling system," *International Journal of Hydrogen Energy*, Vol.21, No.9, pp.769-774.
14. **C.-W. Park**, B.H. Kang, Siyoung Jeong, C. S. Lee, 1995, "An Experimental Study of Heat and Mass Transfer during Absorption and Desorption Processes in a Hydride Material Bed," *Journal of Korean Society of Mechanical Engineering*, Vol.19, No.1, pp.202-211.

**(12) PROFESSIONAL (FULL) PAPER IN CONFERENCE PROCEEDINGS:**

1. **Chanwoo Park**, Michael Crepinsek, 2012, "Experimental Investigation of pump-assisted and capillary-driven dual-evaporators two-phase cooling loop, ASME 2012 Summer Heat Transfer Conference, July 8-12, 2012 Puerto Rico, USA (accepted).
2. Batikan Koroglu, Nick Bogan, **Chanwoo Park**, 2012, Experimental Study of Tube Row effects and Evaporation Heat Transfer Enhancement Using a Micro-Scale, Porous-Layer Coating on a Horizontal-Tube, Falling-Film Heat Exchanger, ASME 2012 3rd Micro/Nanoscale Heat & Mass Transfer International Conference, March 3-6, 2012, Atlanta, Georgia (accepted).
3. Rajib Mahamud and **Chanwoo Park**, 2011, "Spatial-Resolution Lumped-Capacitance Thermal Model for Battery Power Cycle Analysis", *SAE Transactions*, SAE-2011-01-1362.
4. Chanwoo Park\*†, 2011, "Pump-Assisted and Capillary-Driven Two-Phase Loop for Aerospace Applications" 49th AIAA Aerospace Sciences Meeting, Orlando, FL, January 4-7, 2011 (oral presentation).
5. Michael Crepinsek and **Chanwoo Park**, 2011, "Effect of Operational Conditions on Cooling Performance of Pump-Assisted and Capillary-Driven Two-Phase Loop", in the proceedings of the 49th AIAA Aerospace Sciences Meeting, Orlando, FL, January 4-7, 2011, AIAA-2011-811.
6. Sangsoo Lee, **Chanwoo Park**, 2010, "Enhancement of Solution Wetting and Heat Transfer on Horizontal-Tube, Falling-Film Evaporator using Porous-Layer Coating", in the proceedings of 2010 ASME International Mechanical Engineering Congress & Exposition, Vancouver, British Columbia, CANADA, November 12-18, 2010, IMECE2010-37788.
7. Sangsoo Lee, **Chanwoo Park**, Devdatta Kulkarni, Sanjida Tamanna, Ted Knox, 2010, "Heat and Mass Transfer in a Permeable Fabric System under Hot Air Jet Impingement," in the proceedings of the International Heat Transfer Conference (IHTC14), Washington D.C., August 8-13, 2010, IHTC14-22695.
8. Xudong Tang, **Chanwoo Park**, Jeffrey Perez, 2008, "Vibration/Shock-Tolerant Capillary Two-Phase Loop Technology For Vehicle Thermal Management", in the proceedings of 2008 ASME Summer Heat Transfer Conference, Jacksonville, Florida, August 10-14, 2008, HT2008-56349.
9. **Chanwoo Park**, Eric Sunada, 2008, "Vapor-Compression Hybrid Two-Phase Loop Technology for Lunar Surface Applications," *Proceedings of 2008 Space Technology and Applications International Forum (STAIF 2008)*, edited by M.S. El-Genk, AIP Conf. proceedings, Vol.969, Melville, NY, 2008, pp. 37-43.

10. **Chanwoo Park**, Aparna Vallury, Jon Zuo, Jeffrey Perez, Paul Rogers, 2007 “Electronics Thermal Management using Advanced Hybrid Two-Phase Loop Technology,” in the proceedings of 2007 ASME-JSME Thermal Engineering Summer Heat Transfer Conference, Vancouver, British Columbia, CANADA, July 8-12, 2007, HT2007-321962.
11. **Chanwoo Park**, Aparna Vallury, Jon Zuo, Jeffrey Perez, Paul Rogers, 2007, “Spacecraft Thermal Management using Advanced Hybrid Two-Phase Loop Technology,” in the proceedings of 2007 Space Technology and Applications International Forum (STAIF 2007), edited by M.S. El-Genk, AIP Conf. proceedings Vol.608, Melville, New York, 2007, pp.65-72.
12. **Chanwoo Park**, Xudong Tang, Kwang Kim, Joseph Gottschlich, Quinn Leland, 2007, “Metal Hydride Heat Storage Technology for Directed Energy Weapon Systems,” in the proceedings of 2007 ASME International Mechanical Engineering Congress & Exposition, Seattle, Washington, November 10-16, 2007, IMECE 2007-42831.
13. **Chanwoo Park**, Aparna Vallury, Jeffrey Perez, 2006, “Advanced Hybrid Cooling Loop Technology for High Performance Thermal Management,” in the proceedings of 4th International Energy Conversion Engineering Conference, San Diego, California, June 2006, AIAA 2006-4059.
14. **Chanwoo Park**, Jon Zuo, Jeff Perez, 2005, “Advanced Hybrid Loop Technology for High Heat Flux Laser Cooling,” in the proceedings of 3rd International Energy Conversion Engineering Conference, San Francisco, California, August 2005, AIAA 2005-5696.
15. **Chanwoo Park**, Kwang Kim, Joseph Gottschlich, Quinn Leland, 2005, “High Performance Heat Storage and Dissipation Technology,” in the proceedings of 2005 ASME International Mechanical Engineering Congress & Exposition, Orlando, Florida, November 5-11, 2005, IMECE 2005-82313.
16. Jon Zuo, **Chanwoo Park**, David Sarraf, Anthony Paris, 2005, “Robust Cooling of High Heat Fluxes Using Hybrid Loop Technology,” in the proceedings of 2005 Space Technology and Applications International Forum (STAIF 2005) edited by M.S. El-Genk, AIP Conf. proceedings Vol.746, Melville, New York, 2005, pp.64-68.
17. Jon Zuo, **Chanwoo Park**, David Sarraf, 2004, “Hybrid Loop Cooling of High Heat Flux Components,” in the proceedings of 2nd International Energy Conversion Engineering Conference, Providence, Rhode Island, August 2004, AIAA 2004-5612.
18. **Chanwoo Park**, Jon Zuo Paul Rogers, Jeffery Perez, 2004, “Hybrid Loop Thermal Bus Technology For Vehicle Thermal Management”, 24th Army Science Conference, Orlando, FL, November 29 - December 2, 2004.
19. **Chanwoo Park**, Arun K. Jaura, 2003, “Reciprocating Battery Cooling for Hybrid and Fuel Cell Vehicles,” in the proceedings of 2003 ASME International Mechanical Engineering Congress & Exposition, Washington, D.C., November 16-21, 2003, IMECE 2003-41201.
20. Arun K. Jaura, John M. Miller, **Chan-Woo Park**, 2002, “Underhood Thermal Analysis In a HEV Demonstrator to Optimize Cooling Hardware and Package,” in the proceedings of the 2002 Global Powertrain Conference, Ann Arbor, Michigan.
21. **Chan-Woo Park**, Arun K. Jaura, 2002, “Transient Heat Transfer of 42V Ni-MH Batteries for an HEV Application,” in the proceedings of the 2002 Future Car Congress, Arlington, Virginia, SAE-2002-01-1964.
22. **Chan-Woo Park**, Arun K. Jaura, 2002, “Thermal Analysis of Cooling System in Hybrid Electric Vehicles,” SAE Transactions, SAE-2002-01-0710.
23. **C.-W. Park**, M. Kaviany, 2000, “Evaporation-Combustion Affected by In-cylinder, Reciprocating Porous-Regenerator,” in the proceedings of the 2000 International Mechanical Engineering Congress and Exposition, Orlando, Florida, HTD-Vol.366-5, pp.49-56.
24. S.G. Liter, **C.-W. Park**, M. Kaviany, J.T. Wang, J. Kang, Y.G. Lee, 1999, “An Experimental-Based-Model of Fabric Heat Transfer and Its Inclusion in Air Bag Deployment Simulations,” SAE Transactions, SAE-1999-01-0437.
25. **C.-W. Park**, M. Kaviany, 1999, “Combustion-Thermoelectric Tube,” in the proceedings of the 33rd National Heat Transfer Conference, Albuquerque, New Mexico, August 14-17, 1999, NHTC99-211.
26. G.A. Fateev, B.H. Kang, K.J. Kim, **C.-W. Park**, 1996, “Numerical Simulation and Experimental Investigation of Heat Conversion Cycle in Metal Hydride Media”, Heat/Mass Transfer - MIF-96 Heat and Mass Transfer in Capillary-Porous Bodies, A.V. Luikov Heat and Mass Transfer Institute, Minsk, Vol.7, pp.169-182.
27. B.H. Kang, **C.W. Park**, C.S. Lee, 1995, “Experimental Investigation on Dynamic Behavior of a Metal Hydride Cooling System,” in the proceeding of the 3rd Korea-Japan Joint Symposium '95 on Hydrogen Energy, September 1, 1995.
28. T.H. Song, **C.W. Park**, 1992, “Formulation and Application of the Second Order Discrete Ordinate Method,” in the proceeding of the 5th ISPT in thermal engineering, Beijing, pp.833-841.

**(13) MAGAZINE:**

1. Scott Garner, *Chanwoo Park*, William Anderson, and Jon Zuo, "Thermal Control of High Reliability Electronics", *Advanced Microelectronics*, May/June, 2006, pp.8~10.

**(14) PATENTS:**

1. PCT Patent Application Number PCT/US2011/031008, Device Having Nano-Coated Porous Integral Fins (Application filed on April 1, 2011)
2. Invention Disclosure, U.S. Provisional Application Number 61/470999, Device Having Nano-Coated Porous Integral Fins (Application filed on April 1, 2011).
3. Invention Disclosure, Provisional Application Number 61320248, Device Having Nano-Coated Porous Integral Fins (Applications filed on April 2010, 2011).
4. United State Patent #7,172,831, Battery System for Automotive Vehicle, 2007.
5. Korea Patent #125169, Reaction Vessel of Hydrogen Storage Alloy, 1997.
6. United State Patent Publication 20040045749A1, Cooling System and Method for a Hybrid Electric Vehicle, 2004.
7. European Patent Publication EP1396370A1, A Cooling System and Method for a Hybrid Electric Vehicle, 2004.
8. Japanese Patent Publication JP2004100956A, Cooling System and Method for a Hybrid Electric Vehicle, 2004.